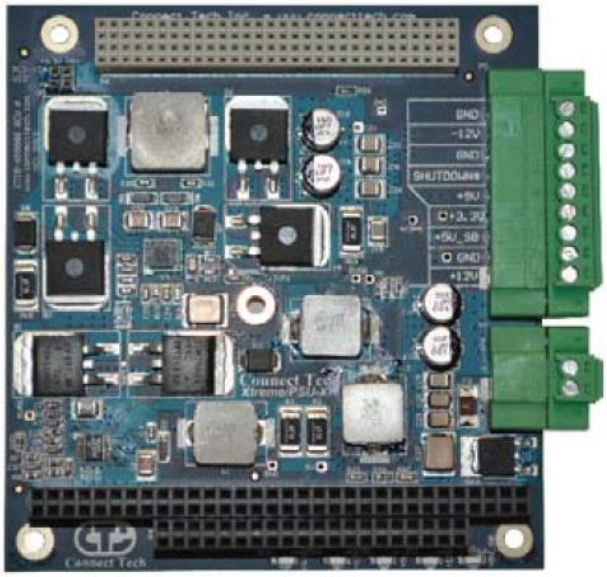
Connect Tech Inc.
Industrial Strength Communications

Xtreme/PSU-XP

User Manual



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Limited Lifetime Warranty

Connect Tech Inc. provides a lifetime warranty for all of our products. Should this product, in Connect Tech Inc.'s opinion, fail to be in good working order during the warranty period, Connect Tech Inc. will, at its option, repair or replace this product at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster or non Connect Tech Inc. authorized modification or repair.

You may obtain warranty service by delivering this product to an authorized Connect Tech Inc. business partner or directly to Connect Tech Inc. along with proof of purchase. Product returned to Connect Tech Inc. must be pre-authorized by Connect Tech Inc. with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured and packaged for safe shipment. Connect Tech Inc. will return this product by prepaid ground shipment service.

The Connect Tech Inc. lifetime warranty is defined as the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, Connect Tech Inc. reserves the right to substitute an equivalent product if available or to retract lifetime warranty if no replacement is available.

The above warranty is the only warranty authorized by Connect Tech Inc. Under no circumstances will Connect Tech Inc. be liable in any way for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, such product.

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Table of Contents

Limited Lifetime Warranty 2
Copyright Notice 2
Trademark Acknowledgment 2
Table of Contents 3
Revision History 3
Customer Support Overview 4
Contact Information 4
Introduction 5
Detailed Technical Specifications 5
Board Diagrams 6
Functional Block Diagram 6
Example Usage Block Diagram 7
Part Number Information 8
Hardware Installation 9
Input Power 10
Input Power Circuit Diagram 10
Technical Specifications 10
Input Power Connector Pinout 10
Output Power 11
Technical Specifications 11
Output Power Connector Pinout 11
PC/104 Bus Connectors Information 12
PCI-104 Connector Pinout 12
PC/104 Pinout 13
PCIe/104 (PCI/104-Express Pinout) 14
Remote ON/OFF Functionality 15
Turn Supply ON 15
Turn Supply OFF 16
Power Sequencing Details 17
ATX Functionality (Available on PCIe versions only) 19
Detailed Specifications and Deratings Graphs 20

Revision History

Revision	Date	Author(s)	Change(s)
0.00	11-29-2012	RC	Initial Manual Revision Created

Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech Inc. reseller from which you purchased the product. In most cases the reseller can help you with product installation and difficulties.

In the event that the reseller is unable to resolve your problem, our highly qualified support staff can assist you. Our support section is available 24 hours a day, 7 days a week on our website at: www.connecttech.com/sub/support/support.asp. See the contact information section below for more information on how to contact us directly. Our technical support is always free.

Contact Information

We offer three ways for you to contact us:

Mail/Courier

You may contact us by letter at:

Connect Tech Inc.
Technical Support
42 Arrow Road, Guelph, ON
Canada N1K 1S6

Email/Internet

You may contact us through the Internet. Our email and URL addresses on the Internet are:
sales@connecttech.com
support@connecttech.com
www.connecttech.com

Note:
Please go to the **Download Zone** or the **Knowledge Database** in the **Support Center** on the Connect Tech Inc. website for product manuals, installation guides, device driver software and technical tips. Submit your technical support questions to our customer support engineers via the **Support Center** on the Connect Tech Inc. website.

Telephone/Facsimile

Technical Support representatives are ready to answer your call Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time. Our numbers for calls are:

Telephone:	800-426-8979 (North America only)
Telephone:	519-836-1291 (Live assistance available 8:30 a.m. to 5:00 p.m. EST, Monday to Friday)
Facsimile:	519-836-4878 (online 24 hours)

Introduction

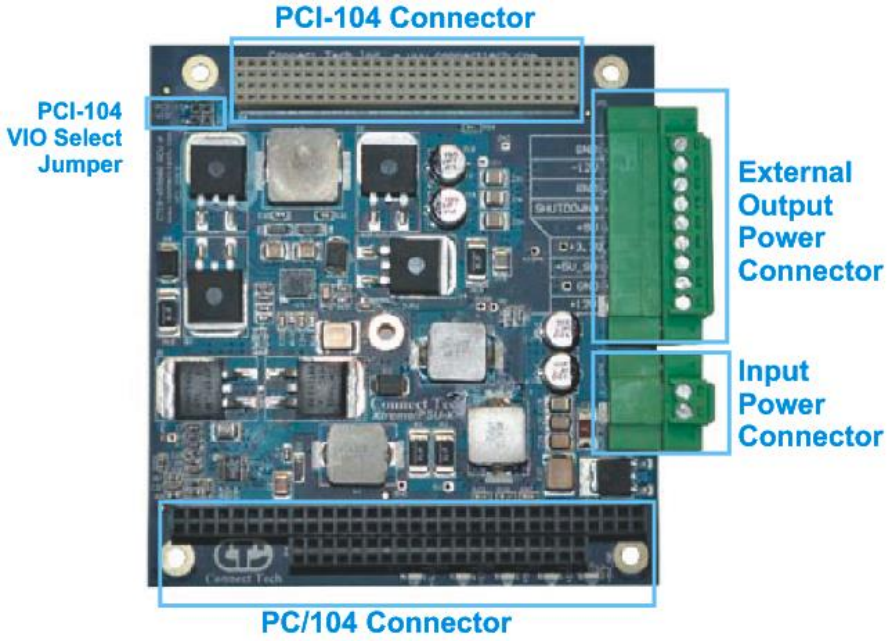
Connect Tech's Xtreme/PSU-XP is a high efficiency, high powered PC/104 form factor power supply with extended temperature capabilities. Xtreme/PSU-XP provides power to terminal block connectors and powers all of the PC/104 family expansions buses such as PC/104, PC/104-Plus, PCI-104, PCI/104-Express and PCIe/104. Xtreme/PSU-XP is a highly reliable power supply which provides 154W of total output power with +5V, +3.3V, +12V, -12V and +5V-Standby output voltages. It can be used as a stand-alone power supply to power any other embedded system, or used directly to power any PC/104 stack or single board computer (SBC). The Xtreme/PSU-XP has a wide input voltage range that accepts +6V to +36V DC and is specifically designed for use in a broad range of rugged applications including military, industrial, and air and ground vehicles. Xtreme/PSU-XP can be used in combination with Connect Tech's stackable CPU and expansion boards for a total design solution

Detailed Technical Specifications

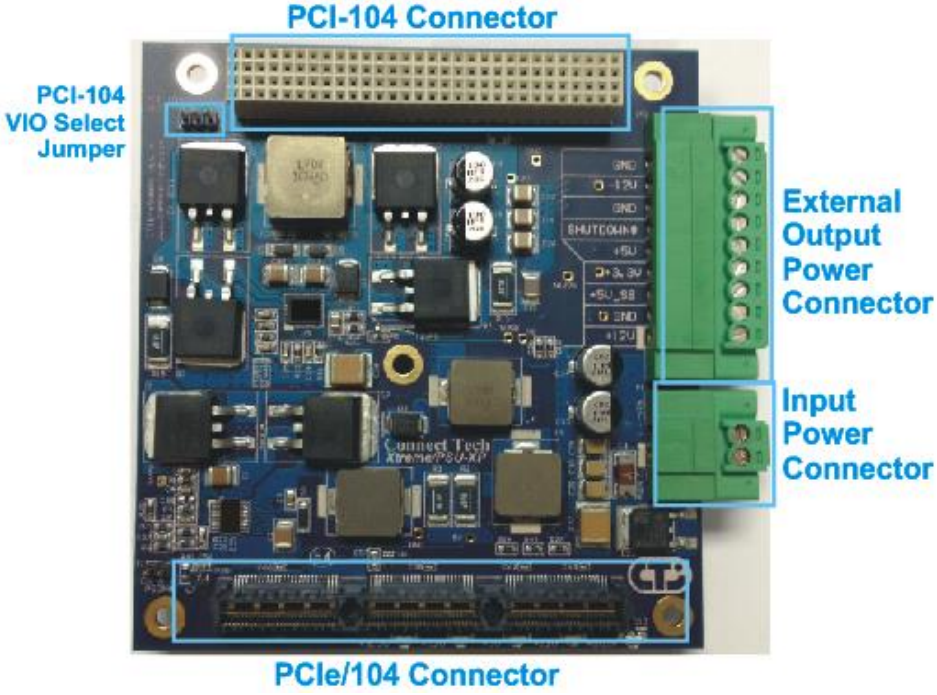
Specification	Details
Dimensions	• 3.550" x 3.775" (90mm x 96) PC/104 Compliant • Fully meets the PC/104 component height requirements • Download 3D Model Files (Click Here) - .step model files
Input Voltage Range	• +6V to +36V DC • Input Suppression Diode and Series Fuse and Reverse Polarity Input Protection • 15A fused maximum power draw protection
+3.3V Output	• 10A (50W) maximum • 1% Output regulation accuracy • <50mV p-p ripple at full load. • Output Current Limiting Protection • Output Overvoltage Protection • Remote ON/OFF control via SHUTDOWN# switch
+5V Output	• 10A (50W) maximum • 1% Output regulation accuracy • <50mV p-p ripple at full load. • Output Current Limiting Protection • Output Overvoltage Protection • Remote ON/OFF control via SHUTDOWN# switch
+12V Output	• 5A (60W) maximum • 1% Output regulation • <40mV p-p ripple at full load. • Output Current Limiting Protection • Output Overvoltage Protection • Remote ON/OFF control via SHUTDOWN# switch
-12V Output	• 0.5A (6W) maximum • 1% Output regulation accuracy • <40mV p-p ripple at full load. • Current limiting protected • Remote ON/OFF control via SHUTDOWN# switch
+5V_SB Output	• 1A (5W) maximum • 1% Output regulation accuracy • <15mV p-p ripple at full load. • Current limiting protected
ATX Functionality	• PWRGOOD and PSON# used on PCIe/104 builds. (PSG010, PSG011)
Operating Temperature	• -40 to +85 Degrees Celsius • See derating section for full details on current consumption vs. input voltage.
Warranty and Support	• Lifetime Warranty • Free Technical Support

Board Diagrams

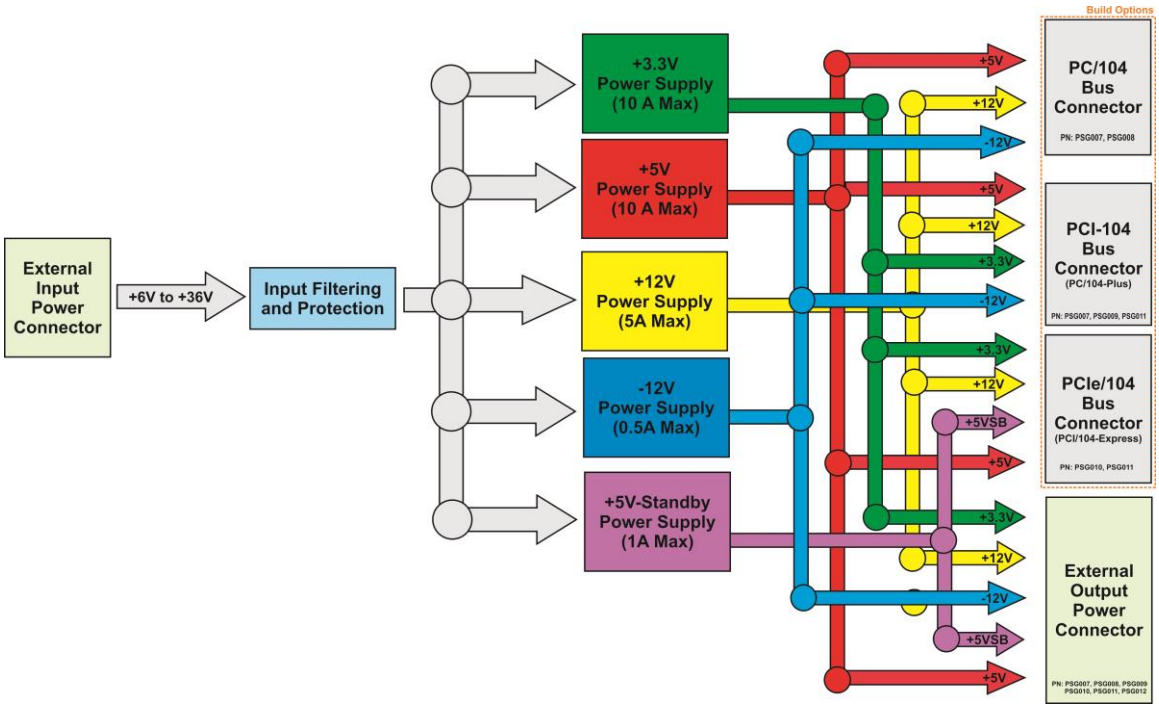
PC/104-Plus Version



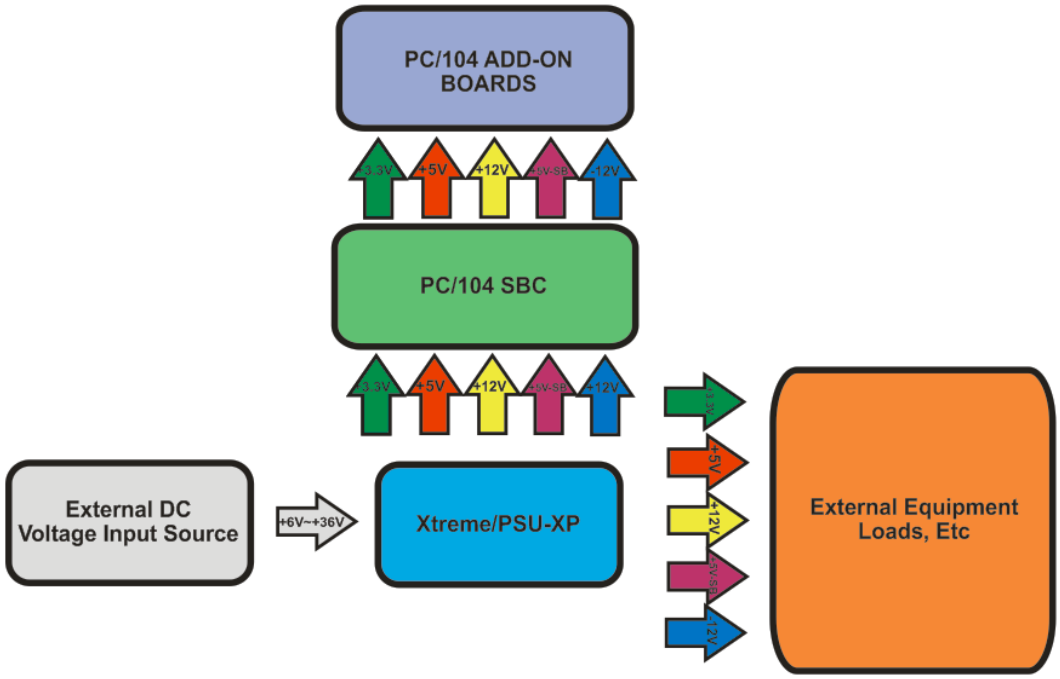
PCI/104-Express Version



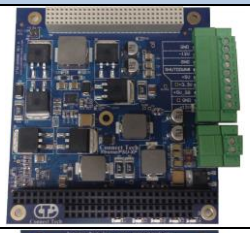
Functional Block Diagram



Example Usage Block Diagram



Part Number Information

Part Number	Features	Board Image
PSG007	**PC/104-Plus Build** - +5V @ 10A, +3.3V @10A,+12V @ 5A, -12V @0.5A, +5VSB @ 1A - +5V, +3.3V, +12V and -12V connected to PC/104 and PCI-104 Bus connectors.	
PSG008	**PC/104 Build** - +5V @ 10A, +3.3V @10A,+12V @ 5A, -12V @0.5A, +5VSB @ 1A - +5V, +3.3V, +12V and -12V connected to PC/104 Bus connector.	
PSG009	**PCI-104 Build** - +5V @ 10A, +3.3V @10A,+12V @ 5A, -12V @0.5A, +5VSB @ 1A - +5V, +3.3V, +12V and -12V connected to PCI-104 Bus connector.	
PSG010	**PCIe/104 Build** - +5V @ 10A, +3.3V @10A,+12V @ 5A, -12V @0.5A, +5VSB @ 1A - +5V, +3.3V, +12V, +5VSB connected to the PCIe/104 bus connector. - Additional ATX Functionality	
PSG011	**PCI/104-Express Build** - +5V @ 10A, +3.3V @10A,+12V @ 5A, -12V @1A, +5VSB @ 1A - +5V, +3.3V, +12V, +5VSB connected to the PCI-104 & PCIe/104 bus connectors. - Additional ATX Functionality	
PSG012	**Embedded Build** - +5V @ 10A, +3.3V @10A,+12V @ 5A, -12V @0.5A, +5VSB @ 1A - No bus connectors installed	

Other available ordering options:

- Aluminum caps removed for vacuum application

To order any of these part numbers or to inquire about the other available ordering options please contact sales@connecttech.com for further information.

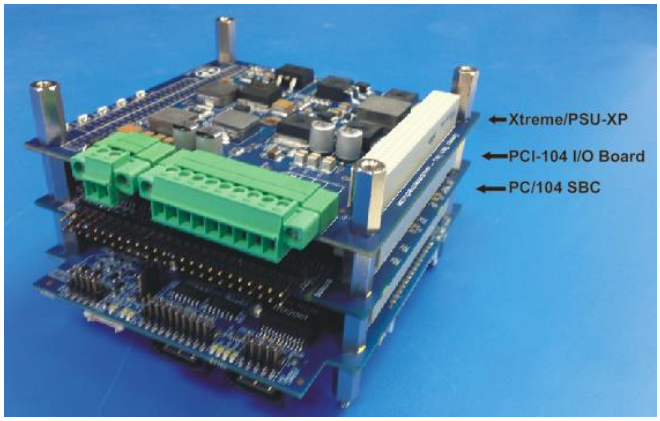
Hardware Installation

The *Xtreme/PSU-XP* can be installed into a PC/104 stack to provide power to the stack through its bus connectors or external power connector. The Xtreme/PSU-XP can also be used as a stand-alone embedded power supply to provide power to any other piece of equipment or embedded SBC.

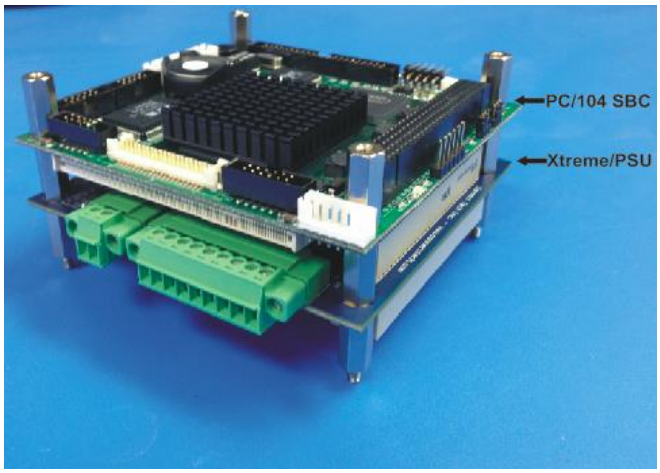
To install the Xtreme/PSU-XP in your system please follow these steps:

1. Ensure your DC input power is OFF (+6V to +36V)
2. Install standoffs into system
3. Insert Xtreme/PSU-XP onto stack (bottom, middle or top) connecting its bus connectors to PC/104, PCI-104, or PCIe/104.
4. Ensure board is bolted/screwed into stack
5. Connect any external power connections to the Xtreme/PSU-XP's External Power Connector
6. Connect input power connection to the Xtreme/PSU's Input Power Connector
   *** WARNING NEVER PLUG IN A LIVE CONNECTION TO THE INPUT POWER ***
7. Power on input power to power up the system.
8. If power button it used via the SHUTDOWN# signal, turn on switch to power system.

PC/104 Stacking Example #1 (Top of Stack)



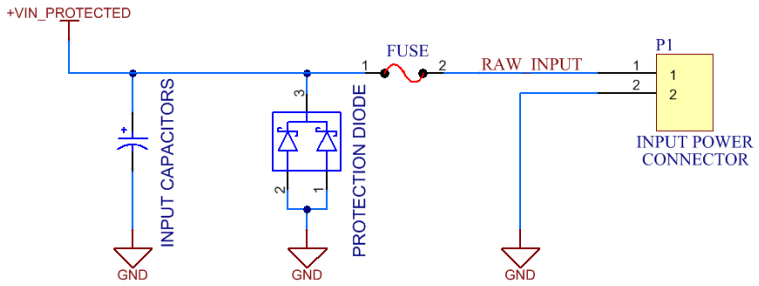
PC/104 Stacking Example #2 (Bottom of Stack)



Input Power

The Xtreme/PSU-XP is meant to use any DC input power source in the rage of +6V to +36V DC, which is ideal for many vehicle or mobile application, but also many industrial power solutions as well.

Input Power Circuit Diagram



Technical Specifications

- Input Voltage Range: +6V to +36V DC
- Input Fuse Rating: 65V Max, 15A Max
- Input Capacitor Max Voltage: 50V Max

Input Power Connector Pinout

The input power connector on the Xtreme/PSU-XP is a standard 2-pin 3.5mm pitch terminal block w/screw flange connector that mates to a 3.5mm screw terminal plug (with or without flange). With your purchase of the Xtreme/PSU-XP you will have received a mating plug connector, below is a list of plug part numbers that are compatible with the PSG.

Input Power Connector Plug Compatible Part Numbers

With Screw Flange

Part Number: 284510-2	Manufacturer: TE Connectivity
Part Number: 1615780000	Manufacturer: Weidmuller
Part Number: 691364100002	Manufacturer: Wurth Electronics Inc
Part Number: OSTTJ0211520	Manufacturer: On Shore Technology Inc
Part Number: 39504-0002	Manufacturer: Molex

Without Screw Flange

Part Number: 284506-2	Manufacturer: TE Connectivity
Part Number: 1615670000	Manufacturer: Weidmuller
Part Number: 691361100002	Manufacturer: Wurth Electronics Inc
Part Number: OSTTJ0211530	Manufacturer: On Shore Technology Inc
Part Number: 39500-0002	Manufacturer: Molex
Part Number: ELXT026G0	Manufacturer: Amphenol

Output Power

The Xtreme/PSU-XP is meant to use any DC input power source in the rage of +6V to +36V DC, which is ideal for many vehicle or mobile application, but also many industrial power solutions as well.

Technical Specifications

The *Xtreme/PSU-XP* outputs 5 main voltage rails:

- +3.3V @ up to 10A
- +5V @ up to 10A
- +12V @ up to 5A
- -12V @ up to 0.5A
- +5V-SB @ up to 1A

All outputs provide:

- Current Limiting Protection
- Overvoltage Protection
- Remote ON/OFF control via SHUTDOWN# switch (+5V standby power is always on and not controlled by SHUTDOWN#)

Detailed graphs/charts on output power be found in the ***Detailed Specifications and Graphs*** section of this manual.

Output Power Connector Pinout

Input Power Connector Plug Compatible Part Numbers

With Screw Flange

Part Number: 284510-6	Manufacturer: TE Connectivity
Part Number: 1615850000	Manufacturer: Weidmuller
Part Number: OSTTJ0911520	Manufacturer: On Shore Technology Inc
Part Number: 39504-0009	Manufacturer: Molex

Without Screw Flange

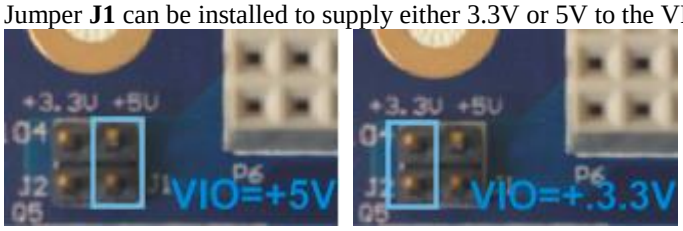
Part Number: 284506-9	Manufacturer: TE Connectivity
Part Number: 1615710000	Manufacturer: Weidmuller
Part Number: OSTTJ0611530	Manufacturer: On Shore Technology Inc
Part Number: 39500-0009	Manufacturer: Molex
Part Number: ELXT096G0	Manufacturer: Amphenol

PC/104 Bus Connectors Information

PCI-104 Connector Pinout

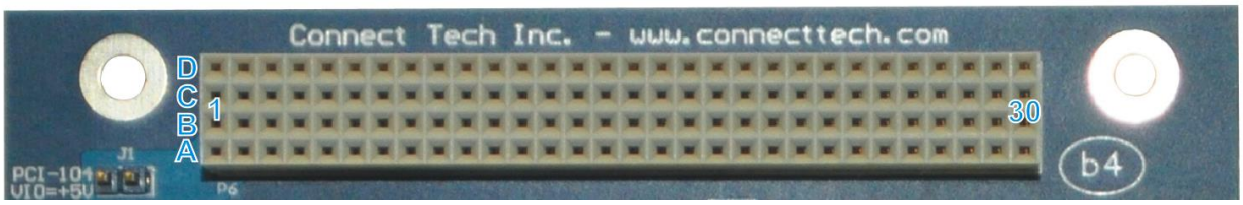
Connector P6 is connects to the PCI-104 bus, a full listing of the pinout of the connector is found in the table below. All connected power rails are shown as well in the table below, any listed "NC" pin will be just a straight pass-through connection, with no on-board connection.

Jumper **J1** can be installed to supply either 3.3V or 5V to the VIO pins on the PCI-104 bus.



***** WARNING: INSTALL ONLY ONE JUMPER INTO J1, NEVER POWER ON WITH BOTH JUMPER LOCATIONS POPULATED *****

Connector Location and Pin Orientation



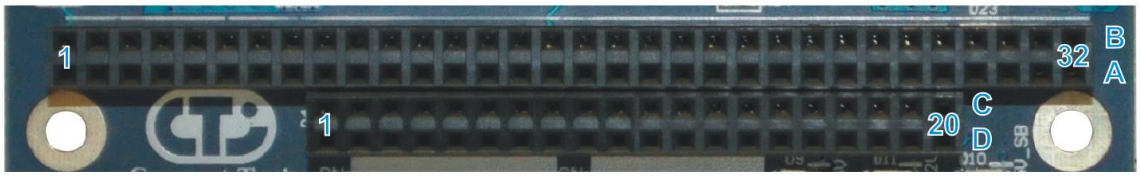
Pinout Table

Pin	A	B	C	D
1	GND	NC	+5V	NC
2	VIO*	NC	NC	+5V
3	NC	GND	NC	NC
4	NC	NC	GND	NC
5	GND	NC	NC	GND
6	NC	VIO*	NC	NC
7	NC	NC	GND	NC
8	+3.3V	NC	NC	+3.3V
9	NC	GND	NC	NC
10	GND	NC	NC	NC
11	NC	+3.3V	NC	GND
12	+3.3V	NC	GND	NC
13	NC	GND	NC	+3.3V
14	GND	NC	+3.3V	NC
15	NC	NC	NC	GND
16	NC	NC	GND	NC
17	+3.3V	NC	NC	+3.3V
18	NC	GND	NC	NC
19	NC	NC	VIO*	NC
20	GND	NC	NC	GND
21	NC	+5V	NC	NC
22	+5V	NC	GND	NC
23	NC	GND	NC	VIO*
24	GND	NC	+5V	NC
25	NC	VIO*	NC	GND
26	+5V	NC	GND	NC
27	NC	+5V	NC	GND
28	GND	NC	+5V	NC
29	+12V	NC	NC	NC
30	-12V	NC	NC	GND

VIO* = Can be set to +3.3V or +5V via on board jumper

PC/104 Pinout

Connector Location and Pin Orientation

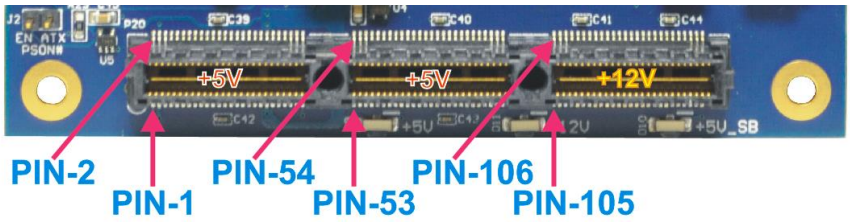


Pinout Table

Pin	A	B	C	D
1	NC	GND	NC	GND
2	NC	NC	NC	NC
3	NC	+5V	NC	NC
4	NC	NC	NC	NC
5	NC	NC	NC	NC
6	NC	NC	NC	NC
7	NC	-12V	NC	NC
8	NC	NC	NC	NC
9	NC	+12V	NC	NC
10	NC	NC	NC	NC
11	NC	NC	NC	NC
12	NC	NC	NC	NC
13	NC	NC	NC	NC
14	NC	NC	NC	NC
15	NC	NC	NC	NC
16	NC	NC	NC	NC
17	NC	NC	NC	+5V
18	NC	NC	NC	NC
19	NC	NC	NC	GND
20	NC	NC	KEY	GND
21	NC	NC		
22	NC	NC		
23	NC	NC		
24	NC	NC		
25	NC	NC		
26	NC	NC		
27	NC	NC		
28	NC	NC		
29	NC	+5V		
30	NC	NC		
31	NC	GND		
32	GND	GND		

PCIe/104 (PCI/104-Express Pinout)

Connector Location and Pin Orientation



Pinout Table

1	NC		NC	2
3	+3.3V		+3.3V	4
5	NC		NC	6
7	NC		NC	8
9	GND		GND	10
11	NC		NC	12
13	NC		NC	14
15	GND		GND	16
17	NC		NC	18
19	NC		NC	20
21	GND		GND	22
23	NC		NC	24
25	NC		NC	26
27	GND	+5V	GND	28
29	NC		NC	30
31	NC		NC	32
33	GND		GND	34
35	NC		NC	36
37	NC		NC	38
39	+5V_SB		+5V_SB	40
41	NC		NC	42
43	NC		NC	44
45	NC		PWRGOOD	46
47	NC		NC	48
49	NC		NC	50
51	NC		PSON#	52
53	NC		NC	54
55	GND		GND	56
57	NC		NC	58
59	NC		NC	60
61	GND		GND	62
63	NC		NC	64
65	NC		NC	66
67	GND		GND	68
69	NC		NC	70
71	NC		NC	72
73	GND		GND	74
75	NC		NC	76
77	NC	+5V	NC	78
79	GND		GND	80
81	NC		NC	82
83	NC		NC	84
85	GND		GND	86
87	NC		NC	88
89	NC		NC	90
91	GND		GND	92
93	NC		NC	94
95	NC		NC	96
97	GND		GND	98
99	NC		NC	100
101	NC		NC	102
103	GND		GND	104
105	NC		NC	106
107	GND		GND	108
109	NC		NC	110
111	NC		NC	112
113	GND		GND	114
115	NC		NC	116
117	NC		NC	118
119	GND		GND	120
121	NC		NC	122
123	NC		NC	124
125	GND		GND	126
127	NC		NC	128
129	NC	+12V	NC	130
131	GND		GND	132
133	NC		NC	134
135	NC		NC	136
137	GND		GND	138
139	NC		NC	140
141	NC		NC	142
143	GND		GND	144
145	NC		NC	146
147	NC		NC	148
149	GND		GND	150
151	NC		NC	152

Remote ON/OFF Functionality

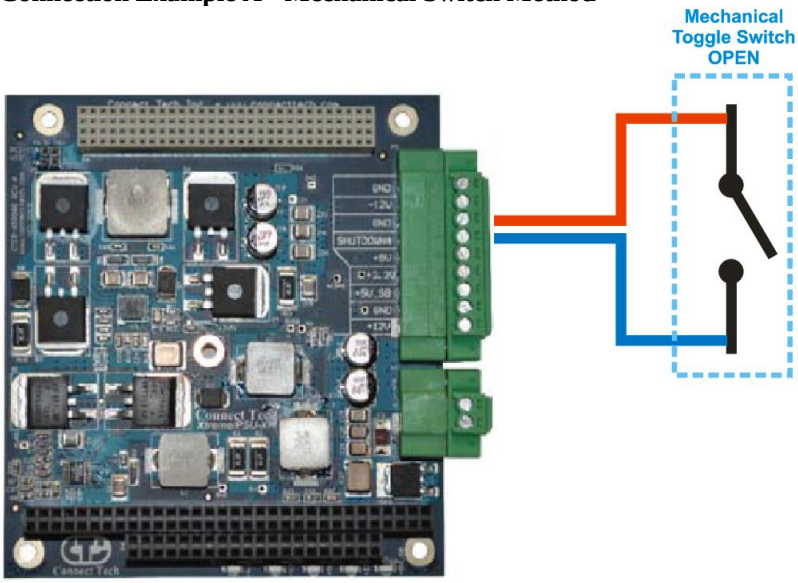
The Xtreme/PSU-XP incorporates remote ON/OFF functionality, in order to necessitate remotely turning the Xtreme PSU ON or OFF from a mechanical switch or digital I/O.

+5V-Standby Functionality
The +5V-Standby power will continue to remain turned ON at all times whenever the input power is present, this will be independent of the SHUTDOWN# pin

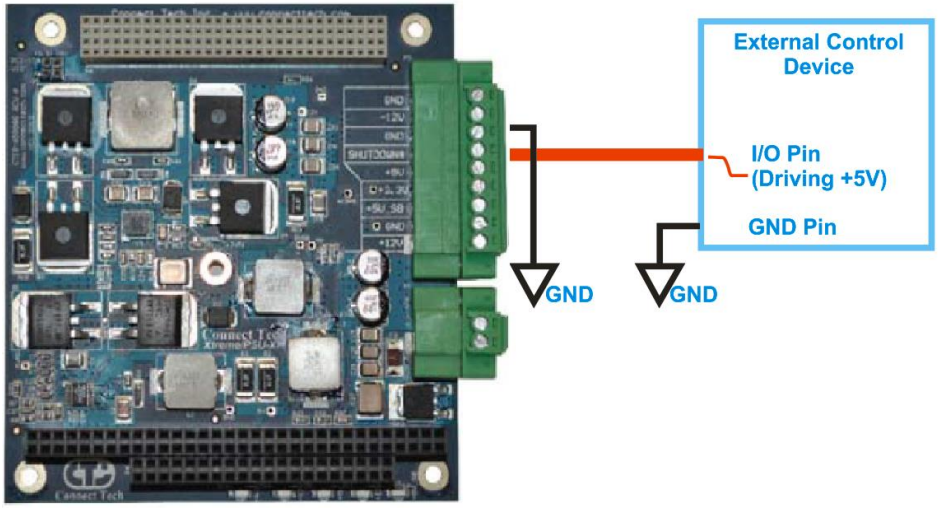
Turn Supply ON

When the SHUTDOWN# pin is left floating, unconnected or is driven externally to a voltage above +1.5V (min) and +5V (max), the Xtreme/PSU's +5V and +12V rails will turn ON.

Connection Example A - Mechanical Switch Method



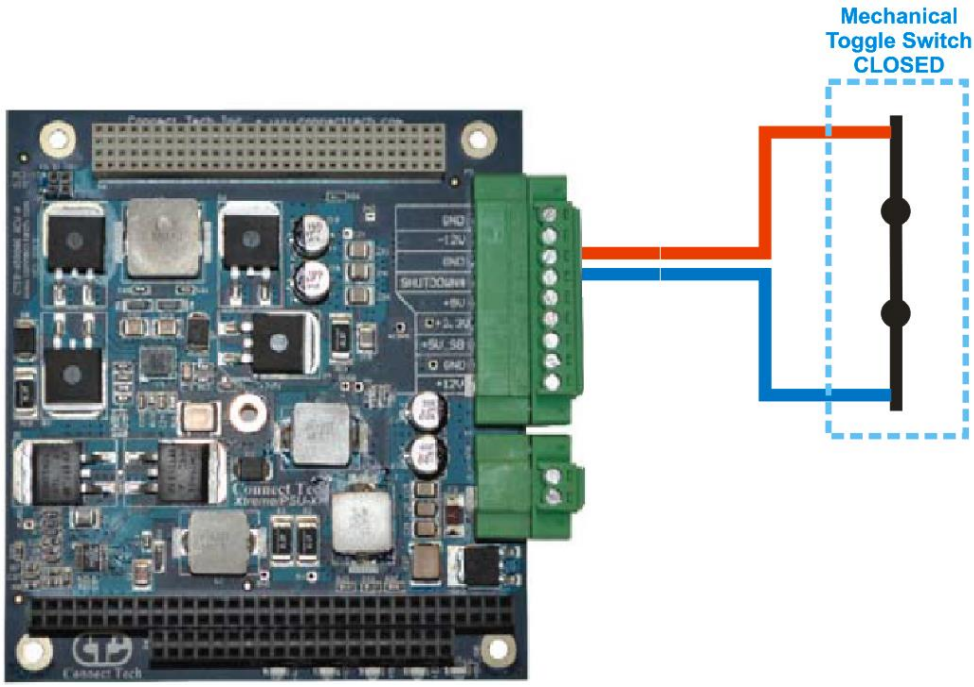
Connection Example B - External I/O Control Method



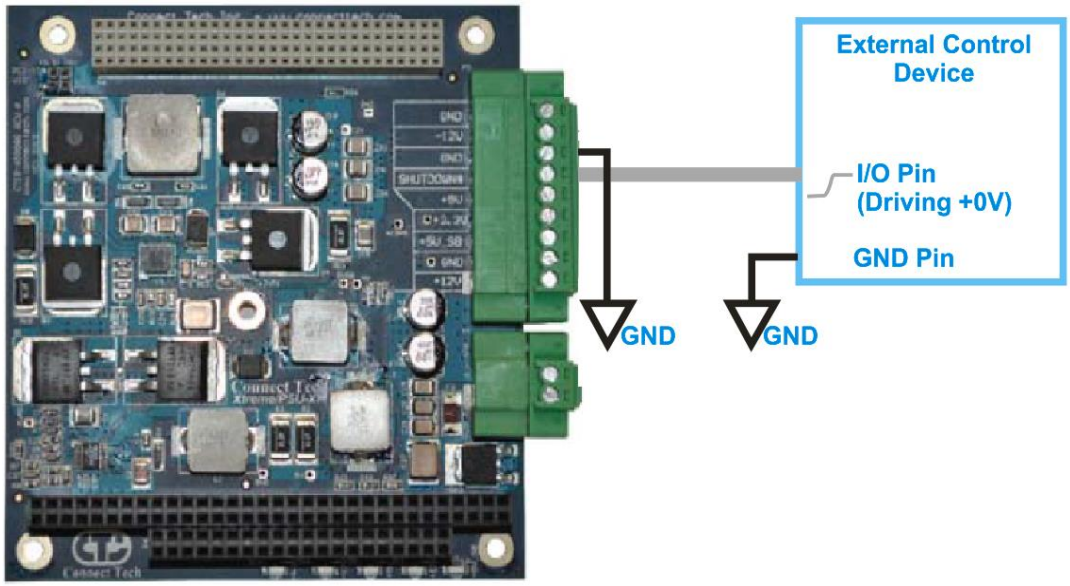
Turn Supply OFF

Connecting the SHUTDOWN# pin to ground the Xtreme/PSU's +5V and +12V will turn OFF. Alternatively the Xtreme/PSU-XP can be turned OFF by driving the SHUTDOWN# pin to a voltage below +1.3V.

Connection Example A - Mechanical Switch Method



Connection Example B - External I/O Control Method

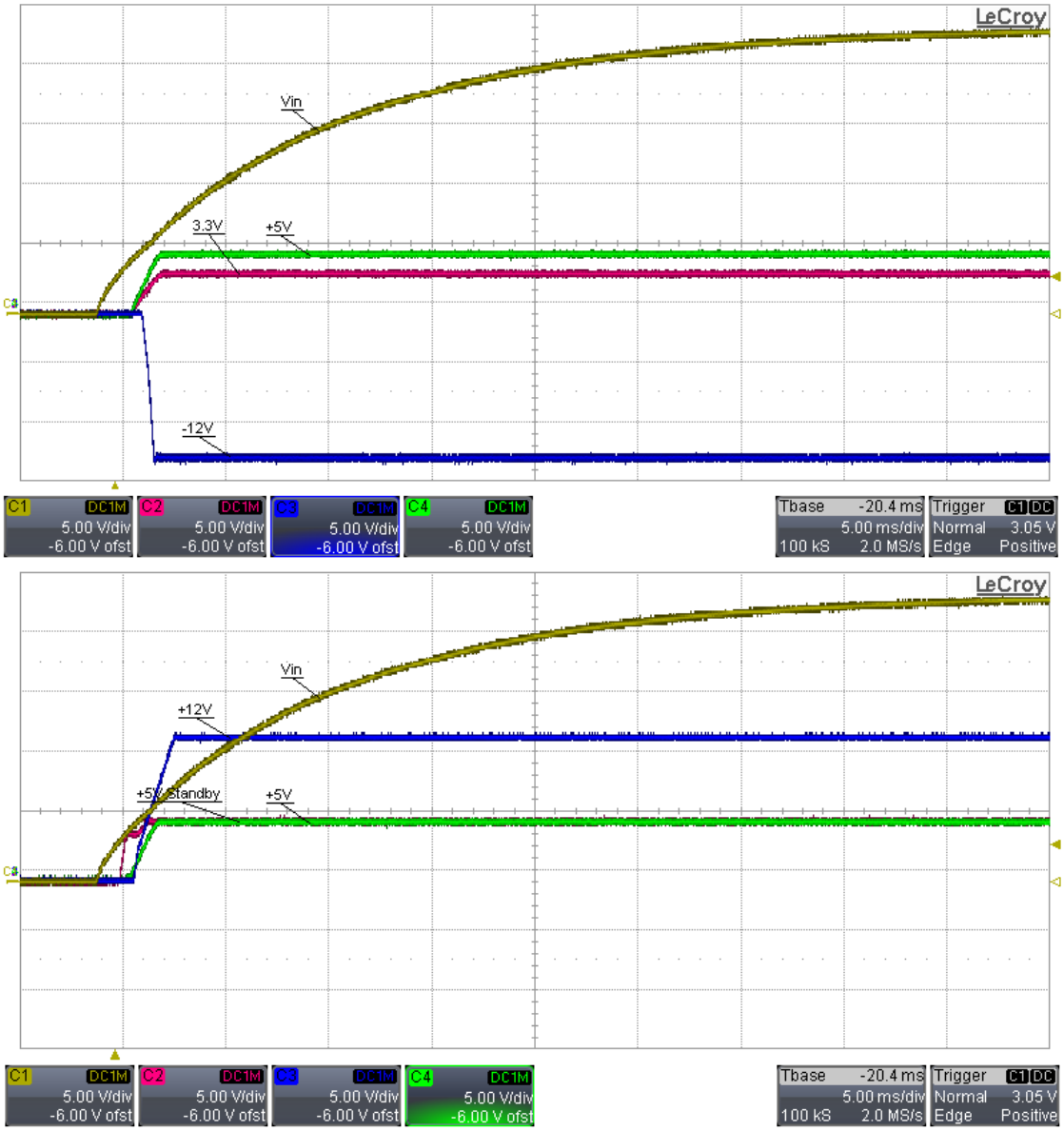


Power Sequencing Details

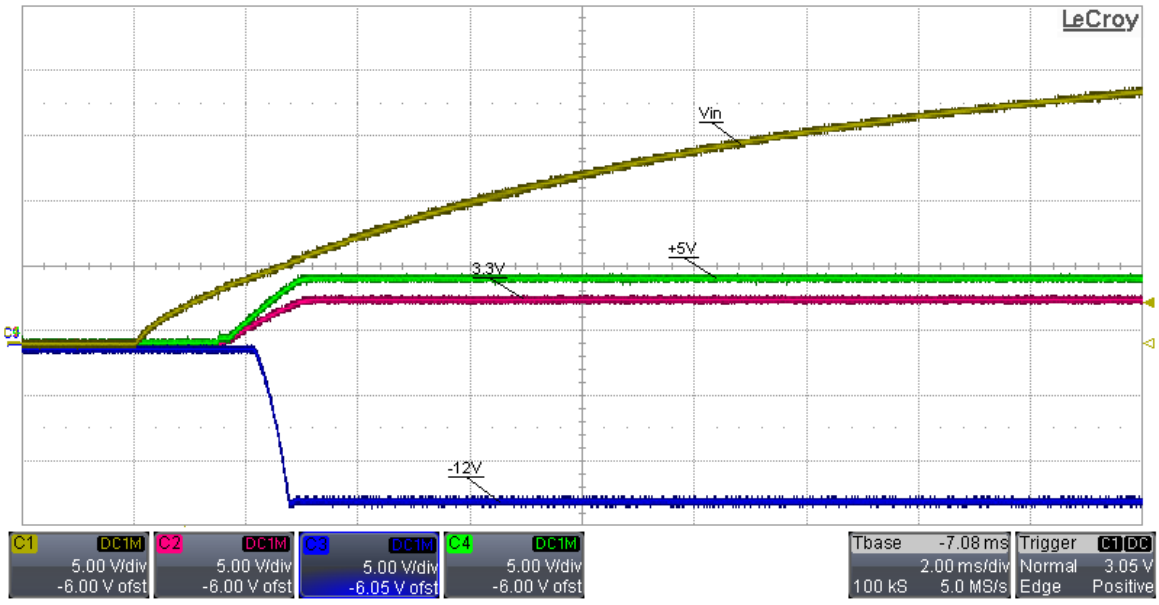
Below are some oscilloscope captures of the Xtreme/PSU's power sequencing during initial power up.

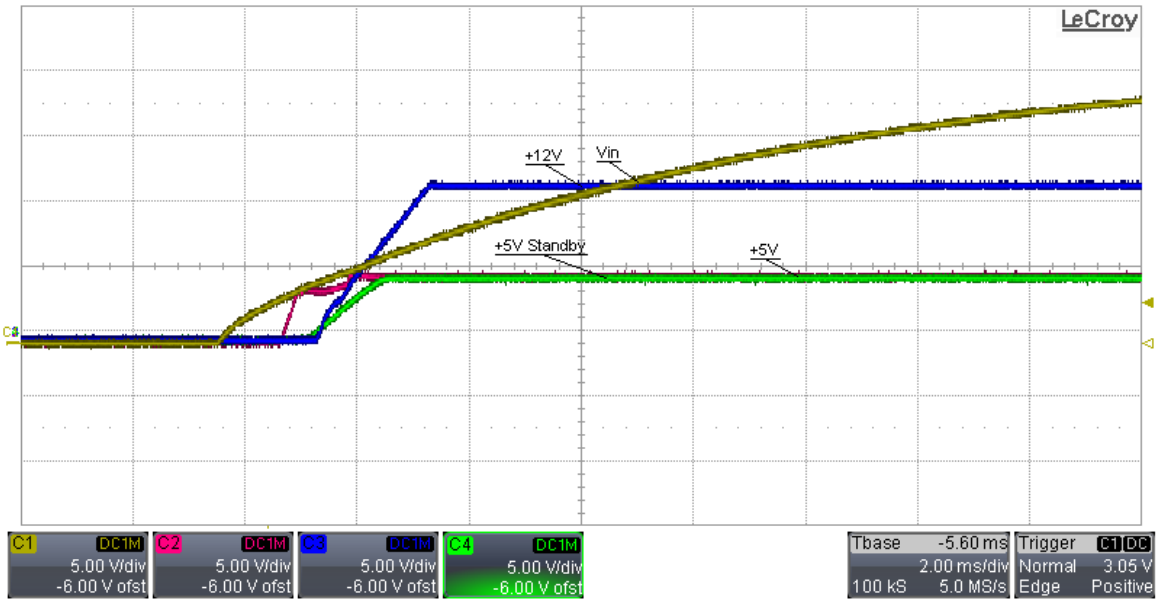
The default sequencing is of the following order: +5V-SB → +5V →+3.3V→-12V→ +12V. If your system requires a different sequence or adjusted parameters, please contact support@connecttech.com and a custom board can be ordered to exactly fit your needs.

VIN = +24V


LeCroy
Vin
3.3V
+5V
-12V
C1 DC1M 5.00 V/div -6.00 V ofst
C2 DC1M 5.00 V/div -6.00 V ofst
C3 DC1M 5.00 V/div -6.00 V ofst
C4 DC1M 5.00 V/div -6.00 V ofst
Tbase -20.4 ms 5.00 ms/div 100 kS 2.0 MS/s
Trigger C1 DC Normal 3.05 V Edge Positive
LeCroy
Vin
+12V
+5V Standby
+5V
C1 DC1M 5.00 V/div -6.00 V ofst
C2 DC1M 5.00 V/div -6.00 V ofst
C3 DC1M 5.00 V/div -6.00 V ofst
C4 DC1M 5.00 V/div -6.00 V ofst
Tbase -20.4 ms 5.00 ms/div 100 kS 2.0 MS/s
Trigger C1 DC Normal 3.05 V Edge Positive

VIN = +10V


LeCroy
Vin
+5V
3.3V
-12V
C1 DC1M 5.00 V/div -6.00 V ofst
C2 DC1M 5.00 V/div -6.00 V ofst
C3 DC1M 5.00 V/div -6.05 V ofst
C4 DC1M 5.00 V/div -6.00 V ofst
Tbase -7.08 ms 2.00 ms/div 100 kS 5.0 MS/s
Trigger C1 DC Normal 3.05 V Edge Positive

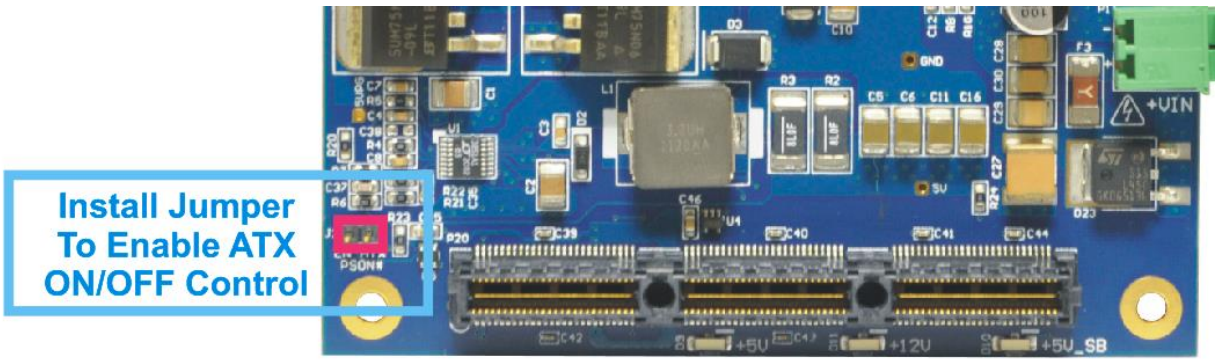

LeCroy
+12V
Vin
+5V Standby
+5V
C1 DC1M 5.00 V/div -6.00 V ofst
C2 DC1M 5.00 V/div -6.00 V ofst
C3 DC1M 5.00 V/div -6.00 V ofst
C4 DC1M 5.00 V/div -6.00 V ofst
Tbase -5.60 ms 2.00 ms/div 100 kS 5.0 MS/s
Trigger C1 DC Normal 3.05 V Edge Positive

ATX Functionality (Available on PCIe versions only)

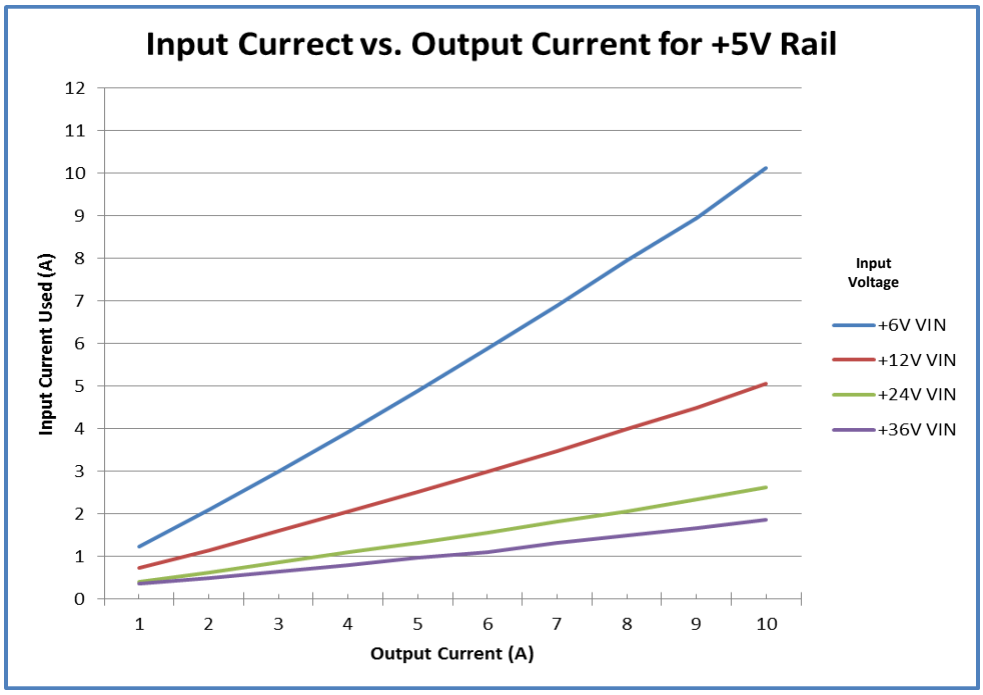
The PCIe/104 and PCI/104-Express versions of the Xtreme/PSU-XP include ATX signaling to interface ATX compliant SBCs. This allows the host SBC to remotely turn ON or OFF the Xtreme/PSU. This also allows the host SBC to receive the proper PWGOOD signal which indicates when the Xtreme/PSU's +5V and +12V rails are at the proper level.

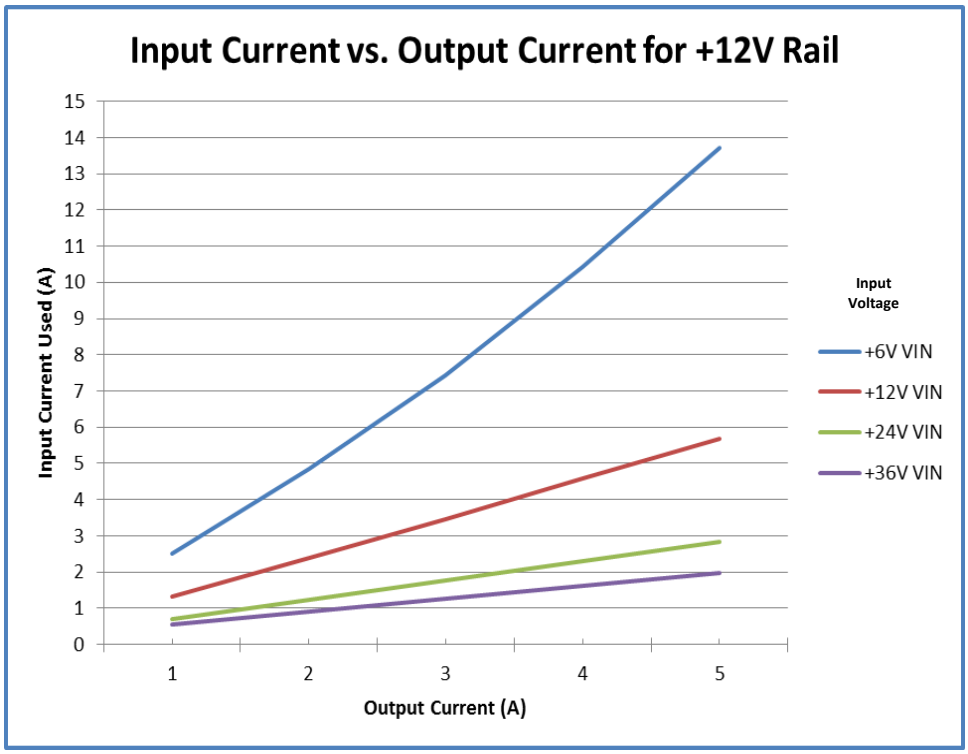
Enabling ATX Functionality

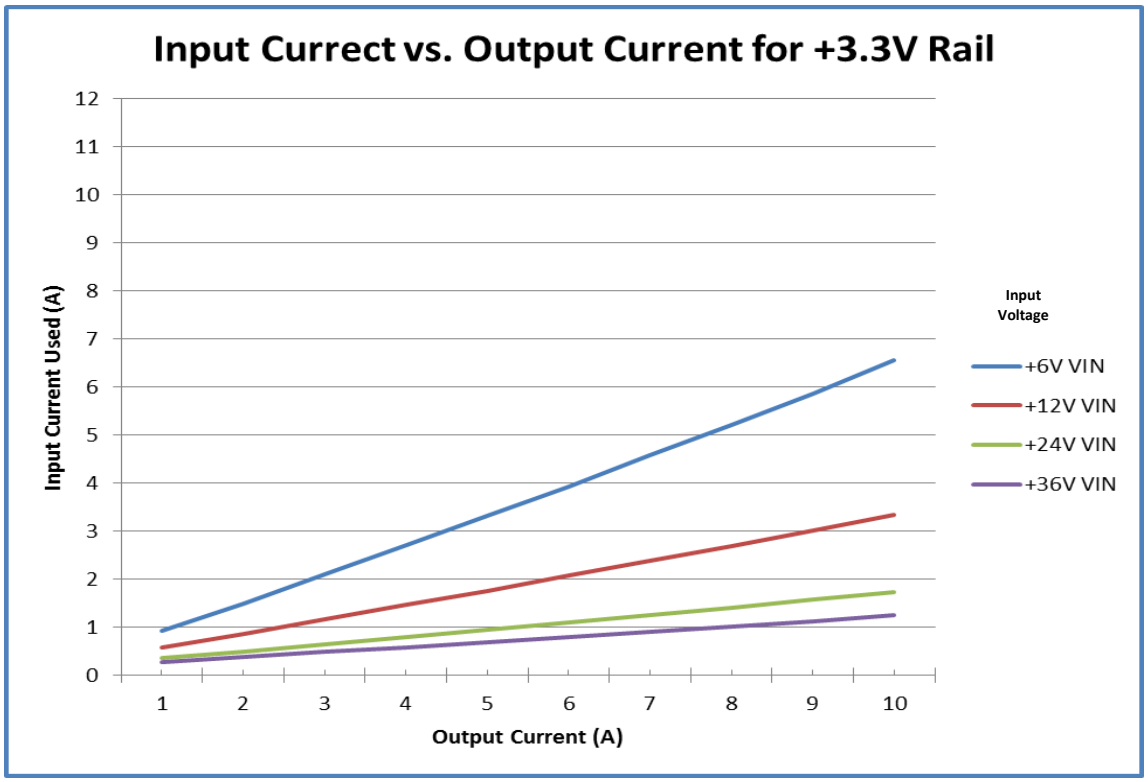
To enable power supply ON/OFF control from the host SBC install a jumper the J2 jumper block. When the jumper is uninstalled the Xtreme/PSU-XP will default to its regular Remote ON/OFF functionality via the SHUTDOWN# pin.

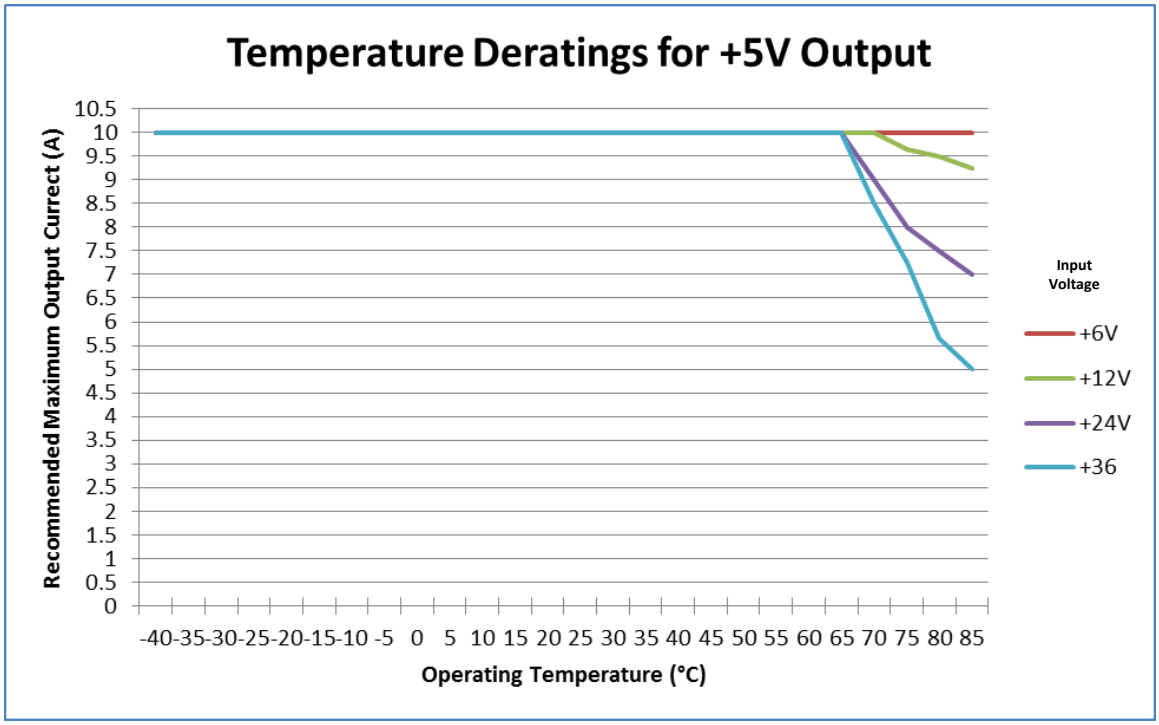


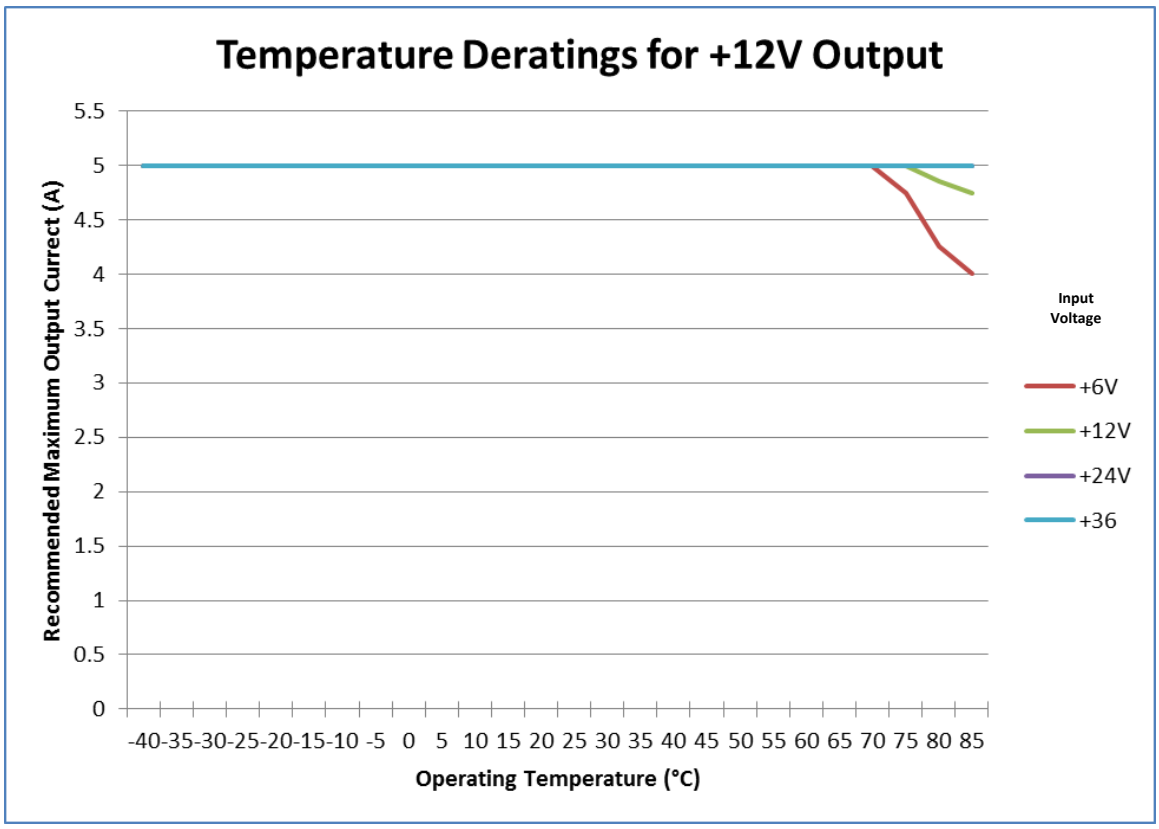
Detailed Specifications and Deratings Graphs

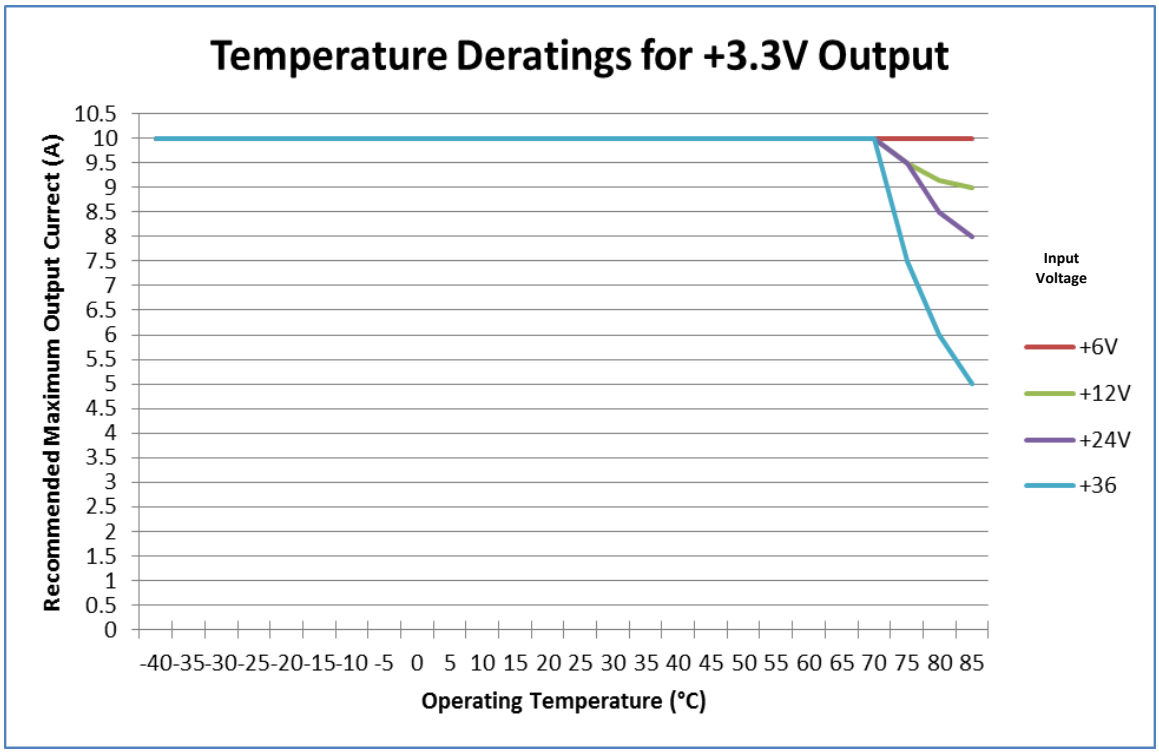





Input Currect vs. Output Current for +3.3V Rail
Input Current Used (A)
0
1
2
3
4
5
6
7
8
9
10
11
12
1
2
3
4
5
6
7
8
9
10
Output Current (A)
Input Voltage
+6V VIN
+12V VIN
+24V VIN
+36V VIN


Temperature Deratings for +5V Output
Recommended Maximum Output Correct (A)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
6.5
7
7.5
8
8.5
9
9.5
10
10.5
-40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85
Operating Temperature (°C)
Input Voltage
+6V
+12V
+24V
+36


Temperature Deratings for +12V Output
Recommended Maximum Output Current (A)
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85
Operating Temperature (°C)
Input Voltage
+6V
+12V
+24V
+36


Temperature Deratings for +3.3V Output
Recommended Maximum Output Current (A)
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-40 -35 -30 -25 -20 -15 -10 -5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85
Operating Temperature (°C)
Input Voltage
+6V
+12V
+24V
+36